

REMARKS

Claims 16-33 are pending in the present application. Claims 16, 20, 22 and 26 have been amended. Claims 28-33 have been presented herewith.

Claim Rejections-35 U.S.C. 112

Claims 16-27 have been rejected under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the written description requirement. This rejection is respectively traversed for the following reasons.

Although Applicant does not necessarily concede that the features regarding the second insulating layer of claim 16 are new matter, claim 16 has been amended to include in combination an insulating layer, merely to advance prosecution of this application. Also, claims 16 and 22 have been amended to delete "essentially". Applicant respectfully submits that claims 16-27 are in compliance with 35 U.S.C. 112, first paragraph, and respectfully urges the Examiner to withdraw this rejection for at least these reasons.

Claims 16-27 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claims 16 and 22 have been amended to be in better compliance with 35 U.S.C. 112, second paragraph. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

Claim Rejections-35 U.S.C. 103

Claims 16-27 have been rejected under 35 U.S.C. 103(a) as being unpatentable over the Tahara et al. reference (U.S. Patent No. 5,356,515) in view of the Yamada reference (U.S. Patent No. 5,827,778) and the Pu et al. reference (U.S. Patent No. 5,843,847), as evidenced by the Collins et al. reference (U.S. Patent No. 6,251,792) and the Demmin et al. reference (U.S. Patent No. 6,635,185). This rejection, insofar as it may pertain to the presently pending claims, is traversed for the following reasons.

Applicant respectfully submits that this rejection is improper for at least the reasons as set forth previously during prosecution of this application. That is, the relied upon prior art taken as a whole does not specifically disclose or suggest intentionally using polymeric products, formed during etching of a misalignment groove, as an etch stop. The prior art references, particularly the Pu et al. reference, are directed to controlling processing so that etching can proceed without excessive formation of passivating products. Although it may be known that passivating products may stop etching, the prior art does not intentionally rely on passivating products as an etch stop. In absence of such a specific teaching, this rejection would appear to be based merely on impermissible hindsight.

The method of forming a conductive path in a semiconductor device of claim 16 includes in combination "forming an insulating layer on a semiconductor substrate, the insulating layer having a first conductive member and a second conductive member embedded therein spaced apart from each other, so that the second conductive

member is below the first conductive member, and so that the first and second conductive members are covered by the insulating layer"... and "etching the insulating layer using the etching mask in a reaction chamber, wherein a reaction chamber pressure is not less than about 100 mTorr, a reaction gas consists of CHF_3 and CO, a flow ratio of CHF_3 and CO is about 15/85, and a flow rate of the reaction gas is not less than about 300 sccm, so that the insulating layer under the opening of the etching mask is removed and an etch stop occurs in the insulating layer between the first and second conductive members without exposing the second conductive member...". Applicant respectfully submits that the prior art as relied upon by the Examiner does not make obvious the above noted features.

The Examiner has primarily relied upon the Tahara et al. reference. The Examiner has however acknowledged that the Tahara et al. reference does not disclose a flow ratio of about 15/85. In an effort to overcome this acknowledged deficiency of the Tahara et al. reference, the Examiner has alleged that the Yamada reference "teaches the etchant may consist essentially of CHF_3/CO ", and that Fig. 6 of the Tahara et al. reference shows the effect of etching rate as a function of flow ratio of CHF_3/CO including a flow ratio of about 15/85. The Examiner has asserted that it would have been obvious to one of ordinary skill in the art to use a suitable flow ratio of CHF_3/CO as disclosed by Yamada in order to have a desired etching rate. Applicant respectfully disagrees for the following reasons.

Contrary to the Examiner's assertion, Fig. 6 of the Yamada reference specifically

shows etching rate as a function of a flow ratio of $\text{CO}/(\text{CO} + \text{CHF}_3)$, not etching rate as a function of a flow ratio of CHF_3/CO . The Examiner has apparently taken the position that the flow ratio $\text{CO}/(\text{CO} + \text{CHF}_3)$ is "essentially" equal to or the same as the flow ratio of CHF_3/CO .

However, since the Yamada reference clearly does not support or suggest such a proposition as offered by the Examiner, and since the Examiner has failed to provide a teaching that discloses such a proposition, it would follow that the corresponding proposition must be within the knowledge of the Examiner. If so, the Examiner is respectfully requested to clearly establish on the record how two clearly different flow ratios such as CHF_3/CO and $\text{CO}/(\text{CO} + \text{CHF}_3)$ can be considered the same, or even "essentially" the same. In absence of a specific teaching or clearly laid out reasoning as established on the record, it would appear that the Examiner has misapplied the Yamada reference.

In the Response to Arguments section beginning on page 7 of the current Office Action dated November 7, 2005, the Examiner has again asserted that "Yamada teaches the etchant may consist essentially of CHF_3/CO ". Applicant respectfully disagrees, because as noted above, the Yamada reference shows in Fig. 6 etching rate as a function of flow ratio of $\text{CO}/(\text{CO} + \text{CHF}_3)$.

The Examiner has further asserted in the Response to Arguments section of the current Office Action that the Yamada reference shows the effect of etching rate as a function of flow ratio of CHF_3/CO "including a flow ratio of about 15/85 (see Fig. 6)".

The Examiner has apparently asserted that this flow ratio of CHF_3/CO of about 15/85 may be arrived at by simple algebra in view of Fig. 6 of the Yamada reference.

However, the Examiner has failed to identify in Fig. 6 of the Yamada reference (which shows etching rate as a function of a flow ratio of $\text{CO}/(\text{CO} + \text{CHF}_3)$), an etching rate that would correspond to a CHF_3/CO flow ratio of 15/85, as would be necessary to meet the features of claim 16. The Examiner is respectfully requested to identify the corresponding CHF_3/CO flow ratio of 15/85 in Fig. 6 of the Yamada reference, and the corresponding algebra relied upon to arrive at such a value.

With further regard to this aspect of the rejection, even assuming for the sake of argument that Fig. 6 of the Yamada reference shows etching rate as a function of a flow ratio of CHF_3/CO (which Applicant does not concede), Fig. 6 would show corresponding etch rates over the given range of flow ratio. Even if a flow ratio of CHF_3/CO of 15/85 hypothetically existed and could be identified in Fig. 6 of the Yamada reference, the description of Fig. 6 in column 6, lines 21-36 of the Yamada reference would provide no teaching to select a specific flow ratio such as 15/85, or any other particular flow ratio, in order to realize an etch rate "so that the insulating layer under the opening of the etching mask is removed and an etch stop occurs in the insulating layer between the first and second conductive members without exposing the second conductive member", as featured in claim 16. Consequently, Applicant respectfully submits that a flow ratio of CHF_3/CO of 15/85 in the Tahara et al. reference would not have been obvious in view of the Yamada reference, as asserted by the

Examiner.

Applicant also respectfully submits that the prior art as relied upon by the Examiner does not disclose or make obvious forming an insulating layer having first and second conductive members embedded therein as featured in claim 16, and subsequently etching the insulating layer "so that the insulating layer under the opening of the etching mask is removed and an etch stop occurs in the insulating layer between the first and second conductive members without exposing the second conductive member". The prior art does not include first and second conductive members as featured, and thus does not teach or suggest etching as further featured. Applicant therefore respectfully submits that the method for forming a conductive pattern of claim 16 would not have been obvious in view of the prior art as relied upon by the Examiner taken singularly or together, and that this rejection, insofar as it may pertain to claims 16-21, is improper for at least these reasons.

The method of forming a conductive path of claim 22 includes in combination "providing a semiconductor structure including a semiconductor substrate, an insulating layer formed on the semiconductor substrate, and first and second conductive members formed in the insulating layer spaced apart from each other, so that the second conductive member is below the first conductive member";... and "etching the insulating layer using the etching mask in a reaction chamber, wherein a reaction chamber pressure is not less than about 100 mTorr, a reaction gas consists of CHF_3 and CO, a flow ratio of CHF_3 and CO is about 15/85, and a flow rate of the reaction gas

is not less than about 300 sccm, so that the insulating layer under the opening of the etching mask is removed to expose the first conductive member and an etch stop occurs in the insulating layer between the first and second conductive members without exposing the second conductive member...".

Applicant respectfully submits that the prior art as relied upon by the Examiner does not disclose or make obvious the above noted features for at least somewhat similar reasons as set forth above with respect to claim 16. Applicant therefore respectfully submits that this rejection, insofar as it may pertain to claims 22-27, is improper for at least these reasons.

Claims 28-33

Applicant respectfully submits that claims 28-33 distinguish over and would not have been obvious in view of the prior art as relied upon by the Examiner, at least by virtue of respective dependency upon claims 16 and 22, and by further reason of the features therein.

Conclusion

The Examiner is respectfully requested to reconsider and withdraw the corresponding rejection, and to pass the claims of the present application to issue, for at least the above reasons.

In the event that there are any outstanding matters remaining in the present

application, please contact Andrew J. Telesz, Jr. (Reg. No. 33,581) at (571) 283-0720 in the Washington, D.C. area, to discuss these matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment for any additional fees that may be required, or credit any overpayment, to Deposit Account No. 50-0238.

Respectfully submitted,

VOLENTINE FRANCO & WHITT, P.L.L.C.

A handwritten signature in black ink, appearing to read 'A. J. Telesz, Jr.', with a stylized flourish at the end.

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